## WHAT IS CLAIMED IS:

- 1. A method for improving corrosion resistance of a turbine engine rotor component, the method comprising the step of implanting aluminum ions, chromium ions, or mixtures thereof on the surface of the component.
- 2. The method of claim 1 wherein the rotor component is a compressor or turbine disk or seal element.
- 3. The method of claim 1 wherein the rotor component has a service operating temperature of from about 540°C to about 815°C.
- 4. The method of claim 1 further comprising implanting yttrium ions, cerium ions, zirconium ions, hafnium ions, or silicon ions, or mixtures thereof, on the surface of the component.
- 5. The method of claim 1 wherein the ions are implanted to a depth of up to about 2 microns.
- 6. The method of claim 5 wherein the ions are implanted to a depth of from about 0.1 to about 0.5 microns.
- 7. The method of claim 1 wherein the ion implantation is conducted at a temperature of from about 20°C to about 700°C.
- 8. The method of claim 7 wherein the ion implantation is conducted at a temperature of from about 20°C to about 320°C.
- 9. The method of claim 8 wherein the ions are implanted to a depth of from about 0.1 to about 0.5 microns.
- 10. The method of claim 1 further comprising the step of heating the implanted component in a nonoxidizing atmosphere to a temperature of from about 500°C to

- about 800°C to diffuse the ions into the surface of the component.
- 11. The method of claim 9 further comprising the step of heating the implanted component in a nonoxidizing atmosphere to a temperature of from about 600°C to about 700°C to diffuse the ions into the surface of the component.
- 12. The method of claim 1 further comprising the step of heating or maintaining the implanted component at a temperature of from about 450°C to about 800°C in the presence of oxygen to form an oxide coating on the surface of the component.
- 13. The method of claim 9 further comprising the step of heating or maintaining the implanted component at a temperature of from about 600°C to about 700°C in the presence of oxygen to form an oxide coating having a thickness of from about 0.5 to about 3 microns on the surface of the component.
- 14. A method for improving corrosion resistance of a turbine engine rotor component, comprising the steps of:
  - (a) providing a rotor component selected from the group consisting of compressor and turbine disks and seal elements;
  - (b) implanting aluminum ions, chromium ions, or mixtures thereof on the surface of the rotor component to a depth of up to about 2 microns; and
  - (c) heating the implanted component in the presence of oxygen to form an oxide coating on the surface of the component.
- 15. The method of claim 14 wherein the rotor component has a service operating temperature of from about 540°C to about 815°C.
- 16. The method of claim 14 further comprising implanting yttrium ions, cerium ions, zirconium ions, hafnium ions, or silicon ions, or mixtures thereof, on the surface of the component.
- 17. The method of claim 14 wherein the ion implantation is conducted at a temperature of from about 20°C to about 320°C.

- 18. The method of claim 17 wherein the ions are implanted to a depth of from about 0.1 to about 0.5 microns.
- 19. The method of claim 14 comprising the step of heating the component to a temperature of from about 450°C to about 800°C in the presence of oxygen to form an oxide coating having a thickness of from about 0.5 to about 3 microns on the surface of the component.
- 20. The method of claim 18 comprising the step of heating the component at a temperature of from about 600°C to about 700°C in the presence of oxygen to form an oxide coating having a thickness of from about 0.5 to about 3 microns on the surface of the component.
- 21. A turbine engine rotor component having improved corrosion resistance comprising a metal-based substrate having implanted aluminum ions, chromium ions, or mixtures thereof on the surface of the substrate.
- 22. The rotor component of claim 21 that is a compressor or turbine disk or seal element.
- 23. The rotor component of claim 21 further comprising implanted yttrium ions, cerium ions, zirconium ions, hafnium ions, or silicon ions, or mixtures thereof, on the surface of the component.
- 24. The rotor component of claim 21 wherein the ions are implanted to a depth of up to about 2 microns.
- 25. The rotor component of claim 24 wherein the ions are implanted to a depth of from about 0.1 to about 0.5 microns.
- 26. The rotor component of claim 25 wherein the ion implantation is conducted at a temperature of from about 20°C to about 320°C.

- 27. The rotor component of claim 21 further comprising an oxide coating on the surface of the component.
- 28. The rotor component of claim 26 further comprising an oxide coating on the surface of the component.
- 29. The rotor component of claim 28 wherein the oxide coating is formed by heating the component to a temperature of from about 600°C to about 700°C in the presence of oxygen to form an oxide coating on the surface of the component.
- 30. The rotor component of claim 29 wherein the oxide coating has a thickness of from about 0.5 to about 3 microns.